Clouds and the Earth's Radiant Energy System (CERES)

Data Management System

Grid Geostationary Narrowband Radiances (GGEO) Subsystem (Subsystem 11.0)

Release 2 Test Plan
TRMM Launch
Version 2

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1.0 Introduction

The Clouds and the Earth's Radiant Energy System (CERES) is a key component of the Earth Observing System (EOS). The CERES instruments are improved models of the Earth Radiation Budget Experiment (ERBE) scanner instruments, which operated from 1984 through 1990 on the National Aeronautics and Space Administration's (NASA) Earth Radiation Budget Satellite (ERBS) and on the National Oceanic and Atmospheric Administration's (NOAA) operational weather satellites NOAA-9 and NOAA-10. The strategy of flying instruments on Sun-synchronous, polar orbiting satellites, such as NOAA-9 and NOAA-10, simultaneously with instruments on satellites that have precessing orbits in lower inclinations, such as ERBS, was successfully developed in ERBE to reduce time sampling errors. CERES will continue that strategy by flying instruments on the polar orbiting EOS platforms simultaneously with an instrument on the Tropical Rainfall Measuring Mission (TRMM) spacecraft, which has an orbital inclination of 35 degrees. In addition, to reduce the uncertainty in data interpretation, and to improve the consistency between the cloud parameters and the radiation fields, CERES will include cloud imager data and other atmospheric parameters. The first CERES instrument is scheduled to be launched on the TRMM spacecraft in 1997. Additional CERES instruments will fly on the EOS-AM platforms, the first of which is scheduled for launch in 1998, and on the EOS-PM platforms, the first of which is scheduled for launch in 2000.

1.1 Document Overview

This document, the Grid Geostationary Narrowband Radiances (GGEO) Subsystem (Subsystem 11), CERES Release 2 Delivery Test Plan, provides a brief description of the GGEO Subsystem of CERES, along with procedures for installing and testing the Subsystem. Acronyms and abbreviations, a directory structure diagram, and file descriptions are contained in the appendices.

The document is organized as follows:
Section 1.0 - Introduction
Section 2.0 - Test Environment
Section 3.0 - Software/Data File Installation Procedures
Section 4.0 - Test and Evaluation Procedures
Appendix A - Acronyms and Abbreviations
Appendix B - Directory Structure Diagram
Appendix C - File Description Tables

The Test Plan is part of the GGEO Release 2 Delivery Package which includes the following items:

1. tar file containing GGEO software

2. tar file containing GGEO test data

3. tar file containing documentation (including this Test Plan)

4. Separate files listing tar file contents

5. Updated Delivery Memo

1.2 GGEO Subsystem Overview

The CERES Project uses satellite-mounted scanner instruments to collect broadband radiative flux measurements around the globe. The purpose of collecting this data is to help atmospheric scientists better understand the Earth's radiant energy budget and to provide them with data for building better cloud models.

One shortcoming of the CERES data is that the number of satellites collecting data is limited to a few orbiting platforms. Because of the orbital characteristics of these platforms, the CERES instruments can view any region on the Earth at most only two or three times during the day. Therefore, every region will have large time gaps for which there are no observational broadband data available.

To help interpolate the data through the gaps, the CERES Project will use narrowband measurements collected by the International Satellite Cloud Climatology Project (ISCCP) to get diurnal variations within each region. The ISCCP data are collected primarily from instruments aboard geostationary satellites which, because of the geostationary nature of their orbits, see only certain regions of the globe, but see them every hour of every day. Geostationary satellites orbit at very high altitudes over the equator, and near-global coverage can be achieved with as little as four or five strategically located satellites. The ISCCP project also collects data from polar orbiting satellites which provide some, but not continuous, coverage at the high latitude regions which are not visible from the geostationary platforms.

GGEO is the Subsystem which grids the ISCCP narrowband data within regions defined by the CERES one-degree nested grid and averages the data over each hour. The CERES Project will only use ISCCP data from every third hour.

GGEO is implemented as two separate Product Generation Executive (PGE) processes: the GGEO Main Processing PGE and the GGEO Postprocessing PGE. The Main Processing PGE acts on all the data files within an input granule and produces an intermediate output file. The GGEO Postprocessing PGE takes all the intermediate files as input and produces an output GGEO file.

GGEO is classified as one of the TISA (Time Interpolation and Spatial Averaging) Gridding Subsystems.

2.0 Test Environment

2.1 External Interface Requirements

The GGEO Release 2 software has been tested at the Science Computing Facility (SCF) with the NAG F90 32-bit compiler and the ECS Toolkit, Version 5.2.1. In order to get proper test results, the code should be compiled with all the environment variables set according to the values specified in the CERES start-up script used for the NAG 32-bit compiler.

2.2 Directory Structure and File Descriptions

The GGEO Subsystem will be delivered in two tar files. One tar file will contain the data files needed to test the Subsystem at the Langley Distributed Active Archive Center (DAAC) and validate the results. The other tar file will contain all other deliverable files associated with the Subsystem. The Directory Structure Diagram and File Description tables are in Appendices B and C, respectively.

3.0 Software/Data File Installation Procedures

This section contains instructions for installing and compiling the GGEO Subsystem.

3.1 Installation

Follow the steps below to install the GGEO software.

1. **source $CERESENV (NAG 32-bit version)**
2. **mv (or cp) ggeo_src_R2-050.tar.Z $CERESHOME**
3. **mv (or cp) ggeo_data_R2-050.tar.Z $CERESHOME**
4. **cd $CERESHOME**
5. **uncompress ggeo_src_R2-050.tar.Z**
6. **uncompress ggeo_data_R2-050.tar.Z**
7. **tar xf ggeo_src_R2-050.tar**
8. **tar xf ggeo_data_R2-050.tar**

3.2 Compilation

Complete the following steps to compile the GGEO source code.

Create the message files and message include files

1. **source $CERESENV (NAG 32-bit version)**
2. **cd $CERESHOME/ggeo/smf**
3. **$CERESLIB/bin/smfcompile_all.csh**

Compile the GGEO Subsystem code

4. **cd $CERESHOME/ggeo/src**
5. **makeall**

Notes:
- The smfcompile_all.csh script and the makefile script will send a message to the screen at completion to indicate whether or not all operations performed were successful. If problems are encountered, contact one of the GGEO analysts before proceeding further.
- DAAC personnel may have an alternate procedure for compiling the message files. Any alternate procedure should copy all message include files to the $PGSINC directory and all message files to the $PGSMSG directory.

4.0 Test and Evaluation Procedures

This section gives instructions on how to run and evaluate the GGEO test.

4.1 Stand-alone Test Procedures

1. **source $CERESENV (NAG 32-bit version)**
2. **cd $CERESHOME/ggeo/test_suites**
3. **runtest**

The runtest script will execute four main processor jobs, each processing a single image from one of the four geostationary satellites. The script then runs a postprocessor job which uses the main processor results as inputs. If all the jobs execute successfully, the script will evaluate the resulting output to determine whether or not the job was successful. This entire process should complete in about forty minutes.

For system resource planning purposes, the unix time utility yielded the following results when the test was run on the thunder machine:

runtest: 1552.116u 513.825s 37:27.69 0+0k 12464k 12398+59io 39pf+0w

4.2 Normal Operating Procedures

The runtest script was created specifically for the test case. To run GGEO jobs under normal operations, the following procedures should be followed:

GGEO Main Processor

1. **[Create a PCF input-text file]**
   Generation of this file is the responsibility of the DAAC. The PCF input-text file contains inputs for the PCF. A sample input-text file generator, called gen_input_main.csh, is in the $CERESHOME/ggeo/bin directory.

2. **$CERESHOME/ggeo/bin/gen_pcf_main.csh** *pcf_input_text_file_name*
   This generates a main processor PCF in the $CERESHOME/ggeo/rcf directory using the PCF input-text file as input.

3. **$CERESHOME/ggeo/bin/run_main.csh** *pcf_filename*
   This executes the main processor using the named PCF file. If this script is run immediately after generation of the PCF in step 2, then it is not necessary to supply the PCF filename as a command-line argument.

GGEO Postprocessor

1. **[Create a PCF input-text file]**
   Generation of this file is the responsibility of the DAAC. The PCF input-text file contains inputs for the PCF. A sample input-text file generator, called gen_input_post.csh, is in the $CERESHOME/ggeo/bin directory.

2. **$CERESHOME/ggeo/bin/gen_pcf_post.csh** *pcf_input_text_file_name*
   This generates a postprocessor PCF in the $CERESHOME/ggeo/rcf directory using the PCF input-text file as input.

3. **$CERESHOME/ggeo/bin/run_post.csh** *pcf_filename*
   This executes the postprocessor using the named PCF file. If this script is run immediately after generation of the PCF in step 2, then it is not necessary to supply the PCF filename as a command-line argument.

4.3 Evaluation Procedures

For the test procedures, the runtest script will report whether or not the test is successful.

For normal operations, there are currently no procedures in place to determine whether a job is successful, other than the normal termination of the job and the existence of output files.

4.4 Solutions to Possible Problems

In the event of problems, contact one of the GGEO analysts.

APPENDIX A
Acronyms and Abbreviations

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Acronyms and Abbreviations

CERES   Clouds and the Earth's Radiant Energy System

DAAC   Distributed Active Archive Center

EOS   Earth Observing System

EOS-AM   EOS Morning Crossing Mission

EOS-PM   EOS Afternoon Crossing Mission

ERBE   Earth Radiation Budget Experiment

ERBS   Earth Radiation Budget Satellite

GGEO   Grid GEOstationary data subsystem

GMS   Geostationary Meteorological Satellite operated by JMA

GOES   Geostationary Operational Environmental Satellite

ISCCP   International Satellite Cloud Climatology Project

JMA   Japan Meteorological Agency, Tokyo, Japan

MCF   Metadata Control File

McIdas   Mon-Computer Interactive Data Access System

METEOSAT   METEOrological Operational SATellite

NASA   National Aeronautics and Space Administration

NOAA   National Oceanic and Atmospheric Administration

PCF   Process Control File

PGE   Product Generation Executive (formerly Generation Executable)

SMF   Status Message File

TISA   Time Interpolation and Spatial Averaging

TRMM   Tropical Rainfall Measuring Mission
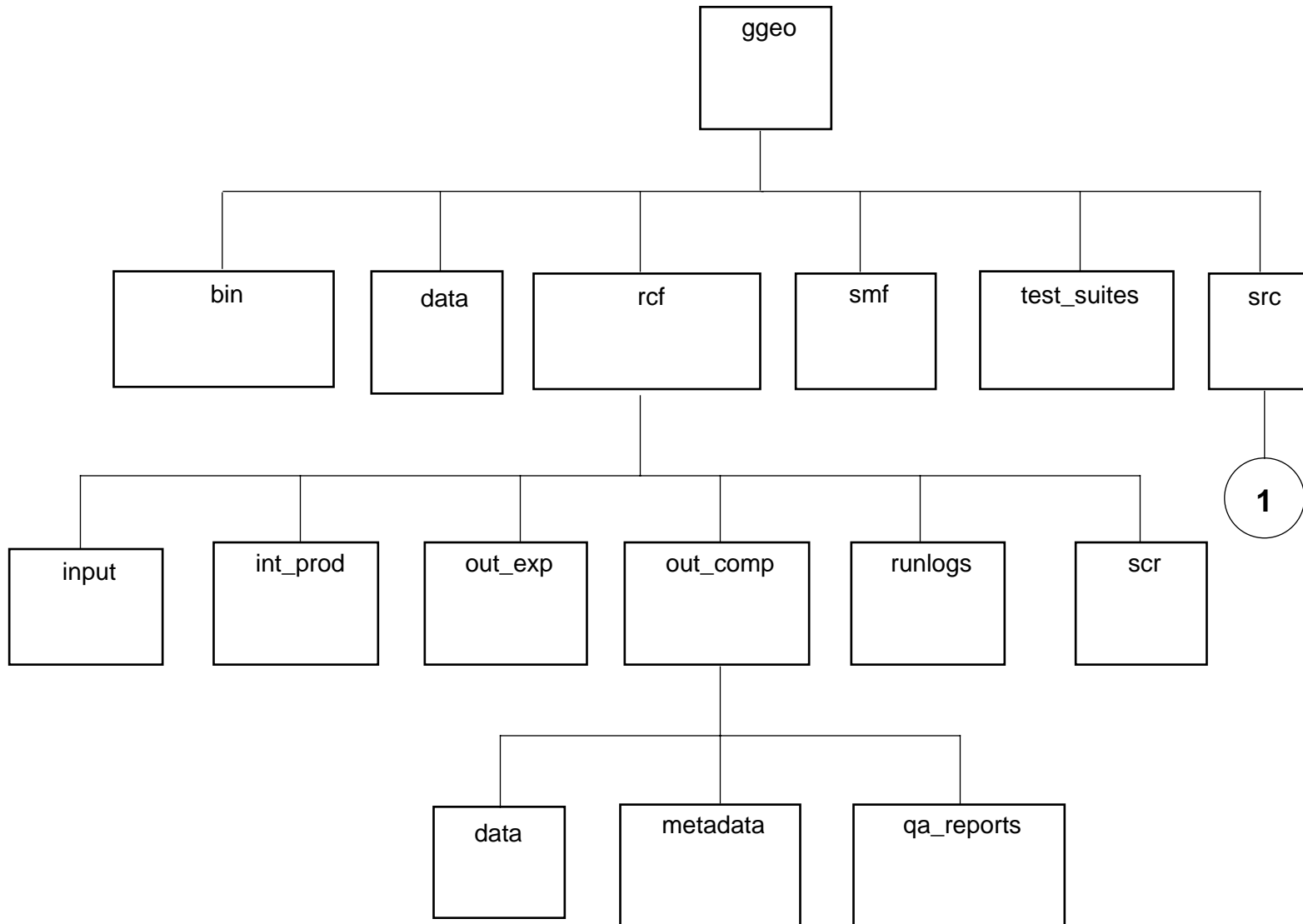
APPENDIX B
Directory Structure Diagram

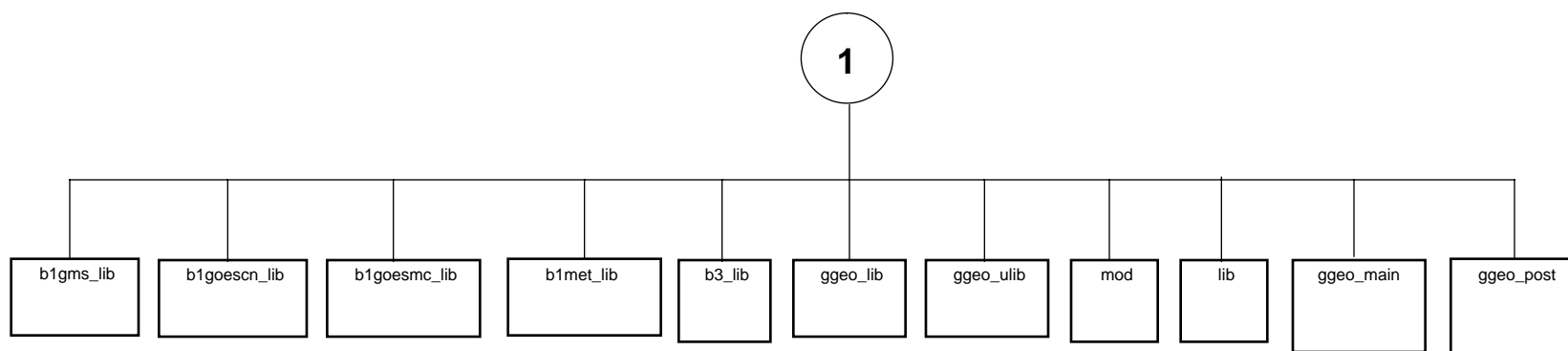Figure B-1. Directory Structure for GGEO Subsystem (1 of 2)

Figure B-1. Directory Structure for GGEO Subsystem (2 of 2)

APPENDIX C
File Description Tables

C.1 Production Scripts and Executables

Table C.1-1. ggeo/bin

File Name	Format	Description
clean_main.csh	ASCII	Removes outputs from main processor job
clean_post.csh	ASCII	Removes outputs from postprocessor job
gen_input_main.csh	ASCII	Generator for main processorPCF input-text file
gen_input_post.csh	ASCII	Generator for postprocessor PCF input-text file
gen_pcf_main.csh	ASCII	Generator for main processor PCF
gen_pcf_post.csh	ASCII	Generator for postprocessor PCF
run_main.csh	ASCII	Script to run main processor
run_post.csh	ASCII	Script to run postprocessor
ggeo_main.exe[a]	Binary	Main Processor executable
ggeo_post.exe[a]	Binary	Postprocessor executable

a. The executable files are generated during compilation and are not included in the tarfile

Table C.1-2. ggeo/test_suites

File Name	Format	Description
customize_pcf_inputs.csh	ASCII	Customizes PCF input-text files to $CERESHOME environment
pcf_input_TRMM_PFM-GMS_199604.txt	ASCII	PCF input-text file for the GMS main processor test run
pcf_input_TRMM_PFM-GOES8_196604.txt	ASCII	PCF input-text file for the GOES-8 main processor test run
pcf_input_TRMM_PFM-GOES9_196604.txt	ASCII	PCF input-text file for the GOES-9 main processor test run
pcf_input_TRMM_PFM-MET_196604.txt	ASCII	PCF input-text file for the METEO-SAT main processor test run

Table C.1-2. ggeo/test_suites

File Name	Format	Description
pcf_input_TRMM_PFM-GOES8_196604.txt	ASCII	PCF input-text file for the postprocessor test run
runtest	ASCII	Test run script

C.2 Processing Control Files (PCF), Metadata Control Files (MCF) and Status Message Files (SMF)

Table C.2-1. ggeo/rcf

File Name	Format	Description
MCF_GGEO	ASCII	Postprocessor MCF
MCF_GRAN	ASCII	Main processor MCF
MCF_POSTQC	ASCII	Postprocessor QC MCF
MCF_QC	ASCII	Main processor QC MCF
template.pcf_main	ASCII	Template for main processor PCF
template.pcf_post	ASCII	Template for postprocessor PCF

Table C.2-2. ggeo/smf

File Name	Format	Description
bgranule.t	ASCII	Message file for b3granule module
ggeomain.t	ASCII	Message file for ggeo main processor program
ggeooutput.t	ASCII	Message file for ggeo_output module
ggeopost.t	ASCII	Message file for ggeo postprocessor program
gmsgranule.t	ASCII	Message file for GMS B1 read routines
granfile.t	ASCII	Message file for ggeo_granfile module
hourbox.t	ASCII	Message file for hourbox module

Table C.2-2. ggeo/smf

File Name	Format	Description
isccpinput.t	ASCII	Message file for isccp_input module
satfile.t	ASCII	Message file for satellite_file module
soldec.t	ASCII	Message file for solar declination module

C.3 Production Makefiles and Source Code

Table C.3-1. ggeo/src

File Name	Format	Description
makeall	ASCII	Script to compile all GGEO source code

Table C.3-2. ggeo/src/b1gms_lib

File Name	Format	Description
Makefile	ASCII	Makefile for GMS library
b1gms_granule.f90	ASCII	GMS library source code
b1gms_lib.c	ASCII	GMS library source code
eb2as_cht.c	ASCII	GMS library source code

Table C.3-3. ggeo/src/b1goescn_lib

File Name	Format	Description
Makefile	ASCII	Makefile for GOES Canadian library
b1goescn_granule.f90	ASCII	GOES Canadian library source code
canada.c	ASCII	GOES Canadian library source code
create_hdr_interface.f90	ASCII	GOES Canadian library source code
create_nav_hdr_interface.f90	ASCII	GOES Canadian library source code

Table C.3-3. ggeo/src/b1goescn_lib

File Name	Format	Description
goes_header.h	ASCII	GOES Canadian library source code

Table C.3-4. ggeo/src/b1goesmc_lib

File Name	Format	Description
Makefile	ASCII	Makefile for GOES McIdas library
b1goesmc_granule.f90	ASCII	GOES McIdas library source code
goes_header.c	ASCII	GOES McIdas library source code
goes_header.h	ASCII	GOES McIdas library source code
nav_sectsel.f90	ASCII	GOES McIdas library source code

Table C.3-5. ggeo/src/b1met_lib

File Name	Format	Description
Makefile	ASCII	Makefile for METEOSAT library
b1met_granule.f90	ASCII	METEOSAT library source code
met.f90	ASCII	METEOSAT library source code
meteosatb1.c	ASCII	METEOSAT library source code
meteosatb1.h	ASCII	METEOSAT library source code

Table C.3-6. ggeo/src/b3_lib (1 of 2)

File Name	Format	Description
Makefile	ASCII	Makefile for B3 library
b3_granule.f90	ASCII	B3 library source code
b3_qc.f90	ASCII	B3 library source code

Table C.3-6. ggeo/src/b3_lib (2 of 2)

File Name	Format	Description
b3_values.f90	ASCII	B3 library source code
calibration_record.f90	ASCII	B3 library source code
data_record.f90	ASCII	B3 library source code
image_file.f90	ASCII	B3 library source code
image_id_record.f90	ASCII	B3 library source code
land_water_file.f90	ASCII	B3 library source code
location_grid_record.f90	ASCII	B3 library source code
volume_id_file.f90	ASCII	B3 library source code
volume_toc_file.f90	ASCII	B3 library source code

Table C.3-7. ggeo/src/ggeo_lib

File Name	Format	Description
Makefile	ASCII	Makefile for GGEO library
ggeo_granfile.f90	ASCII	GGEO library source code
ggeo_output.f90	ASCII	GGEO library source code
ggeo_time_utils.f90	ASCII	GGEO library source code
hourbox.f90	ASCII	GGEO library source code
isccp_input.f90	ASCII	GGEO library source code
navigational_angles.c	ASCII	GGEO library source code
pixel.f90	ASCII	GGEO library source code
satellite_file.f90	ASCII	GGEO library source code
solar_declination.f90	ASCII	GGEO library source code

Table C.3-8. ggeo/src/ggeo_main

File Name	Format	Description
Makefile	ASCII	Makefile for main processor program
ggeo_main.f90	ASCII	Main processor program

Table C.3-9. ggeo/src/ggeo_post

File Name	Format	Description
Makefile	ASCII	Makefile for postprocessor program
ggeo_post.f90	ASCII	Postprocessor program

Table C.3-10. ggeo/src/ggeo_ulib

File Name	Format	Description
Makefile	ASCII	Makefile for GGEO Utility library
bit_module.f90	ASCII	GGEO Utility library source code
ggeo_enum_values.f90	ASCII	GGEO Utility library source code
ggeo_logic_ids.f90	ASCII	GGEO Utility library source code
mc_navigate.f90	ASCII	GGEO Utility library source code
rad_conversion.f90	ASCII	GGEO Utility library source code

C.4 Ancillary Input Data

Not Applicable

C.5 Primary Input Data

These are the test input data files.

Table C.5-1. ggeo/data/input

File Name	Format	Description
B1199604120245	Binary	Main processor GOES-8 input
I0092	Binary	Main processor GOES-8 input
J0149	Binary	Main processor GOES-8 input
K0099	Binary	Main processor GOES-8 input
OA199604120245	Binary	Main processor GOES-8 input

C.6 Output Data Files (Expected Results)

Table C.6-1. ggeo/data/out_exp

File Name	Format	Description
CER_GGEO_TRMM-PFM_PreFlight_00001.199604	Binary	Postprocessor expected output
CER_GRAN_GOES9_PreFlight_00001.199604	Binary	Main processor expected output
CER_GRAN_GMS_PreFlight_00001.199604	Binary	Main processor expected output
CER_GRAN_MET_PreFlight_00001.199604	Binary	Main processor expected output
CER_GRAN_GOES8_PreFlight_00001.199604	Binary	Main processor expected output

C.7 Output Data Files (Production Results)

Table C.7-1. ggeo/data/int_prod

File Name	Format	Description
CER_GRAN_GOES9_PreFlight_00001.199604[a]	Binary	Main processor output
CER_GRAN_GMS_PreFlight_00001.199604[a]	Binary	Main processor output
CER_GRAN_MET_PreFlight_00001.199604[a]	Binary	Main processor output
CER_GRAN_GOES8_PreFlight_00001.199604[a]	Binary	Main processor output

a. These files are created during testing and are not included in the tarfile

Table C.7-2. ggeo/data/out_comp/data

File Name	Format	Description
CER_GGEO_TRMM-PFM_PreFlight_00001.199604[a]	Binary	Postprocessor output

a. This file is created during testing and is not included in the tarfile

C.8 Output Temporary Data Files (Production Results)

Table C.8-1. ggeo/test_suites

File Name	Format	Description
PCF_TRMM-PFM-GMS_199604[a]	ASCII	Main processor PCF
PCF_TRMM-PFM-GOES8_199604[a]	ASCII	Main processor PCF
PCF_TRMM-PFM-GOES9_199604[a]	ASCII	Main processor PCF
PCF_TRMM-PFM-MET_199604[a]	ASCII	Main processor PCF
PCF_TRMM-PFM_199604[a]	ASCII	Postprocessor PCF

a. These files are created during testing and are not included in the tarfile

Table C.8-2. ggeo/test_suites

File Name	Format	Description
CER_GGEO_TRMM-PFM_PreFlight_00001.199604.met[a]	ASCII	Main processor metadata
CER_GRAN_GMS_PreFlight_00001.199604.met[a]	ASCII	Main processor metadata
CER_GRAN_GOES8_PreFlight_00001.199604.met[a]	ASCII	Main processor metadata
CER_GRAN_GOES9_PreFlight_00001.199604.met[a]	ASCII	Main processor metadata
CER_GRAN_MET_PreFlight_00001.199604.met[a]	ASCII	Main processor metadata
CER_OQCRP_GMS_PreFlight_00001.199604.met[a]	ASCII	Main processor metadata
CER_OQCRP_GOES8_PreFlight_00001.199604.met[a]	ASCII	Main processor metadata
CER_OQCRP_GOES9_PreFlight_00001.199604.met[a]	ASCII	Main processor metadata
CER_OQCRP_MET_PreFlight_00001.199604.met[a]	ASCII	Main processor metadata

a. These files are created during testing and are not included in the tarfile

C.9 Error and Status Message Files (Expected Results)

Table C.9-1. ggeo/data/runlogs

File Name	Format	Description
LogReport_TRMM-PFM-GMS_199604[a]	ASCII	Main Processor Report Log
LogReport_TRMM-PFM-GOES8_199604[a]	ASCII	Main Processor Report Log
LogReport_TRMM-PFM-GOES9_199604[a]	ASCII	Main Processor Report Log
LogReport_TRMM-PFM-MET_199604[a]	ASCII	Main Processor Report Log
LogReport_TRMM-PFM_199604[a]	ASCII	Postprocessor Report Log
LogStatus_TRMM-PFM-GMS_199604[a]	ASCII	Main Processor Status Log
LogStatus_TRMM-PFM-GOES8_199604[a]	ASCII	Main Processor Status Log
LogStatus_TRMM-PFM-GOES9_199604[a]	ASCII	Main Processor Status Log
LogStatus_TRMM-PFM-MET_199604[a]	ASCII	Main Processor Status Log
LogStatus_TRMM-PFM_199604[a]	ASCII	Postprocessor Status Log
LogUser_TRMM-PFM-GMS_199604[a]	ASCII	Main Processor User Log
LogUser_TRMM-PFM-GOES8_199604[a]	ASCII	Main Processor User Log
LogUser_TRMM-PFM-GOES9_199604[a]	ASCII	Main Processor User Log
LogUser_TRMM-PFM-MET_199604[a]	ASCII	Main Processor User Log
LogUser_TRMM-PFM_199604[a]	ASCII	Postprocessor User Log

a. These files are created during testing and are not included in the tarfile

C.10 Test Evaluation Software

Not Applicable